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AF/2821

Patent
Attorney's Docket No. 026125-076

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| In re Patent Application of | **Mail Stop Appeal Brief - Patents** |
| Erland CASSEL et al. | Group Art Unit: 2821 |
| Application No.: 09/887,144 | Examiner: Michael C. Wimer |
| Filed: June 22, 2001 | Confirmation No.: 7758 |
| For: Antenna for a Portable Communication Apparatus, and a Portable Communication Apparatus Comprising Such an Antenna | |

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## BRIEF FOR APPELLANT TRANMSITTAL LETTER

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This appeal is from the decision of the Examiner dated April 9, 2003 (Paper No. 10), finally rejecting claims 17-21, 25, 26, and 30-32, which are reproduced as an Appendix to this brief.

The Commissioner is hereby authorized to charge the Government fee of $330.00 for filing this Brief to Deposit Account No. 02-4800.

Also enclosed herewith are two extra copies of this Brief.

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800. This paper is submitted in duplicate.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: [signature]
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Date: October 14, 2003

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on October 14, 2003

Jennie Snead
*(Typed Name of Person Signing Certificate)*

[signature]
*(Signature of Person Signing Certificate)*
Date of Signing: October 14, 2003

Patent
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## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Erland CASSEL et al.

Application No.: 09/887,144

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For: Antenna for a Portable Communication Apparatus, and a Portable Communication Apparatus Comprising Such an Antenna

Mail Stop Appeal Brief - Patents

Group Art Unit: 2821

Examiner: Michael C. Wimer

Confirmation No.: 7758

13#/Appeal Brief
10/23/03
D Brown

## BRIEF FOR APPELLANT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This appeal is from the decision of the Examiner dated April 9, 2003 (Paper No. 10), finally rejecting claims 17-21, 25, 26, and 30-32, which are reproduced as an Appendix to this brief.

Also enclosed herewith are two extra copies of this brief.

## I. REAL PARTY IN INTEREST

This application is assigned to Telefonaktiebolaget LM Ericsson (Publ), SE-126 25, Stockholm, Sweden.

## II. RELATED APPEALS AND INTERFERENCES

Appellants' legal representative knows of no other appeals or interferences which will affect or be directly affected by or have bearing on the Board's decision in this appeal.

## III. STATUS OF CLAIMS

The application was filed on June 22, 2001, with claims 1-16. Claims 1-16 were canceled and claims 17-32 added by preliminary amendment. Claims 17-32 are pending. Claims 22-24, 27, and 28 are allowable, and claim 29 is allowed. Claims 17-21, 25, 26, and 30-32 stand finally rejected.

Pursuant to 37 C.F.R. § 1.191(a), Applicants hereby appeal the Examiner's decision finally rejecting claims 17-21, 25, 26, and 30-32 to the Board of Patent Appeals and Interferences.

## IV. STATUS OF AMENDMENTS

All amendments have been entered. A final Office Action was mailed on April 9, 2003, finally rejecting claims 17-21, 25, 26, and 30-32 for anticipation under 35 U.S.C. § 102(e).

No amendments were made to the claims after the final Office Action. A copy of the claims on appeal is attached as Appendix A.

## V. SUMMARY OF THE INVENTION[1]

The claims relate to an antenna for a portable communication apparatus, such as a mobile telephone, that can operate as a single band, multi-band, or super-broadband antenna. The antenna includes a radiator (e.g., element 30 shown in FIG. 3) having a first end for connecting to the radio circuitry[2]. A feedback conductor (e.g., element 33 shown in FIG. 3) is connected to an opposite end of the radiator and extends back along the radiator in a direction toward the radio circuitry. The feedback conductor provides for tuning a frequency range of the antenna. The claims provide for an antenna having improved antenna gain, and requiring no separate impedance matching circuit when coupled to radio circuitry in the portable communication apparatus.

FIG. 1 depicts a prior-art antenna suitable for connection to the radio circuitry of a mobile telephone. The prior-art antenna includes a helical radiator 10 and an impedance matching circuit 13. The impedance matching circuit 13 can be used to match the relatively high impedance of the helical radiator 10, e.g., about 200 Ohms in the "end-fed" (or end-connected) configuration shown, to the relatively low impedance of a coaxial cable, e.g., about 50 Ohms, typically used to connect the radiator 10 to the radio circuitry. P. 1, ll. 27-36, and p. 5, ll. 6-15. The electrical length of the helical radiator 10 can be designed such that the radiator 10 acts as a halfwave-resonant dipole antenna when fed by a radio-frequency (RF) source included in the radio circuitry (not shown). P. 2, ll. 5-7. The arrow in the figure indicates the current (I) direction during a half-cycle of the RF source, and the dotted line indicates the relative magnitude of the current along the radiator 10. As can be seen from the figure, the current magnitude is lowest (and the impedance highest) at the ends of the halfwave-resonant dipole, reaching a maximum value at its midpoint. The physical length of the wire forming the helical radiator 10 is typically less than its

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[1] This summary is provided in accordance with 37 C.F.R. §1.192(c)(5) and is not intended to limit the subject matter claimed to the specific embodiments described herein.

[2] All page number citations in Sections V and VIII are to the specification as originally filed.

electrical length (e.g., about five percent) to account for propagation losses.

FIG. 2 depicts a theoretical antenna design that includes a linear portion 23 connected to one end of a helical radiator 20. The helical radiator 20 is equivalent to the radiator 10 of the prior-art antenna shown in FIG. 1. The linear portion 23 can be made to have an electrical length equal to the electrical length of the helical radiator 20, e.g., one halfwave in the example shown. P. 5, ll. 22-24. The relative current directions and magnitudes in each of the helical radiator 20 and linear portion 23 are shown in the figure. As can be seen in the figure, the magnitude of the current reaches a minimum and changes direction (i.e., changes phase by 180°) at the point 22 where the helical radiator 20 and linear portion 23 are connected. P. 5, ll. 26-32. It has been observed that when the linear portion 23 of the theoretical antenna shown in FIG. 2 is bent downward by 180° so as to be arranged alongside the helical radiator 20, the current distribution (both the magnitude and phase) are maintained in the linear portion 23. P. 5, l. 32 - p. 6, l. 4; and FIG. 3.

FIG. 3 depicts an antenna according to a first embodiment having a helical radiator 30 connected at one end 32 to a linear feedback conductor 33. The opposite end 31 of the helical radiator can be connected to radio circuitry of a portable communication apparatus. The feedback conductor 33 is bent by 180° at the connection 32 so as to extend downward alongside the helical radiator 30. It will be understood that when the wire portions forming the helical radiator 30 and feedback conductor 33 are designed to have the same electrical length (e.g., one halfwave), the free (or unconnected) end of the linear feedback conductor 33 will extend past the body of the coiled helical radiator 30. P. 6, ll. 13-18.

To achieve a desired current distribution (e.g., halfwave) in the feedback conductor 33, the portion that extends below the body of the radiator 30 cannot simply be "cut off", but instead must be maintained. It has been observed that when the portion of the linear halfwave feedback conductor 33 that would extend below the body of the helical radiator 30 is arranged into an inductive load, such as the endcoil 34 shown in FIG. 3, the desired halfwave current distribution in the feedback conductor 33 can be substantially maintained. P. 6, ll. 18-28. Moreover, the arrangement of the endcoil 34 in relation to the helical radiator 30 can be used to

tune the resonant frequencies of the antenna and control its input impedance. P. 6, l. 34 - p. 7, l. 1.

For example, it has been observed that by positioning the endcoil 34 near the end 31 of the helical radiator 30 to be connected to the radio circuitry, the helical radiator 30 can achieve resonance at a number of frequency bands having center frequencies that are relatively close to one another (e.g., 900 MHz and 1750 MHz). P. 7, ll. 6-12. Moreover, it has been observed that a halfwave current distribution in the feedback conductor 33 and its endcoil 34 can be maintained even when the electrical length of the helical radiator 30 is other than one halfwave. P. 7, l. 29 - p. 8, l. 2. Consequently, proper dimensioning of the helical radiator 30, in combination with the loading of the feedback conductor 33 and its endcoil 34, can be used to increase the input current of an end-fed halfwave dipole antenna to achieve an antenna input impedance that is matched to a 50-Ohm coaxial cable without the need for an impedance matching circuit 13. P. 8, ll. 3-19.

FIGS. 4-7, and the corresponding portions of the specification, describe other exemplary embodiments that achieve desirable antenna frequency tuning and impedance matching capabilities.

## VI. <u>ISSUES</u>

The issues presented on appeal are:

- whether claims 17, 25, 26, and 30-32 are unpatentable under 35 U.S.C. § 102(e) over U.S. Patent No. 6,275,198 to Kenoun et al. ("Kenoun"); and
- whether claims 18-21 are unpatentable under 35 U.S.C. § 102(e) over Kenoun.

## VII. <u>GROUPING OF CLAIMS</u>

Claims 17-21, 25, 26, and 30-32, which are rejected for anticipation under 35 U.S.C. § 102(e), do not stand or fall together.

Claims 17, 25, 26, and 30-32 (Group 1) stand or fall together. Claim 17 is representative of this group, and is directed to an antenna for a portable

communication apparatus. The antenna includes a radiator having a first end to be connected to radio circuitry in the portable communication apparatus, and a second end. The antenna also includes a feedback conductor having a first end that is electrically connected to the second end of the radiator. The feedback conductor extends along the radiator in a first direction from the second end of the radiator toward the first end of the radiator. The feedback conductor includes a second end, extending along the radiator in a second direction toward the second end of the radiator, for tuning a frequency range of the antenna.

Claims 18-21 (Group 2) stand or fall together. Dependent claim 18 is representative of this group and is directed to the antenna of claim 17, but additionally recites that the radiator is an elongated helical radiator.

## VIII. ARGUMENT

### A. THE CLAIMS OF GROUP 1 ARE NOT ANTICIPATED BY KENOUN BECAUSE ALL OF THE CLAIMED FEATURES ARE NOT DISCLOSED IN THE CITED DOCUMENT

#### 1. Kenoun

Kenoun describes a wide-band dual-mode antenna. The antenna 10 includes an electrically conductive wire 50 having a first end 52 that is electrically coupled through a monopole portion 12 to a transceiver circuit (i.e., radio circuitry) of a cellular communication device. Col. 2, ll. 44-49; col. 3, l. 65 - col. 4, l. 2; and FIG. 3. A second end 54 of the wire 50 is electrically floating. Col. 4, ll. 4-5. The wire 50 includes three segments. A first linear segment 56 extends from the first end 52 of the wire 50 to a U-shaped portion 68. A second linear segment 58 extends from the U-shaped portion 68 of the wire back toward the first end 52 of the wire 50 and the monopole portion 12. A third segment 62 includes a linear offset portion 64, connected to the second linear segment 58 near the monopole 12, and a helical portion 66, extending from the linear offset portion 64 to the second floating end 54 of the wire 50. Col. 4, ll. 5-11; and FIG. 3. Accordingly, the first segment 56 of the wire 50 is coupled to the radio circuitry and is linear, and the helical portion 66 of the

wire 50 is part of the third segment 62 that forms the free end of the antenna 10.

Kenoun describes that the total length of the wire 50 (which includes the length of the monopole 12) is selected to determine a first resonant frequency of the antenna 10. Col. 4, ll. 25-27. A second mode (or frequency) of resonance is determined by a first distance 60, which separates the first and second segments 56, 58 of the antenna 10. As the first distance 60 decreases, the first and second modes of resonance come closer together (e.g., the difference between the second and first resonant frequencies decreases). Col. 4, ll. 37-39. Accordingly, the modes of resonance or tunable range of frequencies for the antenna 10 are determined by both the total length of the wire 50 and the separation 60 between the first and second segments 56, 58 of the wire 50.

Kenoun also describes that the helical portion 66 of the third segment 62 surrounds the first and second segments 56, 58, so that the wire 50 is self-coupled to the first and second segments 56, 58 through a surrounding dielectric core material. Col. 4, ll. 45-48. Kenoun describes that the length of the offset portion 64 of the third segment 62 is varied to adjust the bandwidth of the frequency response of the antenna 10 at the first and second resonant frequencies. Col. 4, ll. 48-51. For example, if the length of the offset portion 64 is shortened so that the helical portion 66 begins in close proximity to the head portion 44 of the monopole 12, then the bandwidth at the first (i.e., the lower) resonant frequency decreases. Col. 4, ll. 51-56. Accordingly, the helical portion 66 of the third segment 62 self-couples the first and second segments 56, 58 through the surrounding dielectric core material, and the offset portion 64 of the third segment 62 adjusts the bandwidth(s) of the already established first and second resonant frequencies.

### 2. <u>Features of the Claims</u>

The claims of Group 1 differ from the antenna arrangement described in Kenoun in several respects. For example, the antenna defined by independent claim 17 includes a feedback conductor electrically connected to one end of a radiator, the radiator having an opposing end to be connected to radio circuitry in a portable communication apparatus. The feedback conductor extends along the

radiator in a first direction from the connection to the radiator toward the opposing end of the radiator to be connected to the radio circuitry. The feedback conductor loads the radiator, allowing its input impedance to be controlled and matched to the impedance of the radio circuitry without requiring additional impedance matching circuitry.

The feedback conductor also includes a second end extending along the radiator in a second direction from the end of the radiator to be connected to the radio circuitry, toward the opposing end of the radiator. The second end of the feedback conductor allows for tuning a frequency range of the antenna.

### 3. Errors in Examiner's Rejection

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior document. Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. MPEP § 2131, citing Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236 (Fed. Cir. 1989).

Kenoun does not set forth each and every element of claim 17 and, thus, claim 17 is not anticipated by the cited document. For example, Kenoun does not disclose a feedback conductor (1) having a second end extending along the radiator in a second direction toward the second end of the radiator, for tuning a frequency range of the antenna, and (2) that extends along the radiator in a first direction from the second end of the radiator toward the first end of the radiator.

#### a) A Second End Extending Along the Radiator in a Second Direction Towards the Second End of the Radiator, for Tuning a Frequency Range of the Antenna

In the final Office Action, the Examiner incorrectly contends that Kenoun discloses a feedback conductor including "a second end 64 extending along the radiator in a second direction towards the second end of the radiator for tuning the frequency range of the antenna". Final Action, p. 2 (emphasis added).

As noted above, Kenoun describes that that the length of the offset portion 64

of the third segment 62 is used to vary the bandwidth of the frequency response of the antenna 10 at the first and second resonant frequencies. Col. 4, ll. 48-51. Kenoun describes that if the length of the offset portion 64 is shortened so that the helical portion 66 begins in close proximity to the head portion 44 of the monopole portion 12, then the bandwidth at the first (i.e., the lower) resonant frequency decreases. Col. 4, ll. 51-56.

The Examiner confirms this operation of Kenoun's offset portion 64 in an Advisory Action mailed on July 18, 2003, correctly stating that "[i]t is the length of the offset portion 64 (of the third segment 62) of the feedback conductor which can be varied to adjust the bandwidth of the frequency response of the antenna 10 at the first and second [resonant] frequencies". Advisory Action, p. 2 (emphasis added). The Examiner then incorrectly concludes that "the precise purpose of the feedback conductor in Kenoun et al is the same as that of applicant, i.e., it tunes the frequency range of the antenna" Id. (emphasis added).

Kenoun's offset portion 64 does not tune the frequency range of the antenna 10 as the Examiner contends. Instead, Kenoun describes that the offset portion 64 can be used to vary the bandwidth of an already tuned frequency band. As noted above, Kenoun describes that the modes of resonance, or the tunable range of frequencies, for the antenna 10 are determined by the total length of the wire 50 and the separation 60 between the first and second segments 56, 58 of the wire 50. Nowhere does Kenoun disclose that the offset portion 64, or any other portion of the third segment 62, can be used for tuning the frequency range of the antenna 10. Indeed, Kenoun describes in detail that the first and second segments 56, 58 are used to tune the resonant modes of the antenna 10, and the third segment 62, including its offset portion 64, is used to vary the bandwidth of those already tuned modes of resonance.

While the MPEP requires that the claims be interpreted as broadly as their terms reasonably allow, the words of the claim must be given their plain meaning unless another clear definition is provided in the specification. MPEP § 2111.01. "Plain meaning" refers to the meaning given to a term by those of ordinary skill in the art. Id. (citing Rexnord Corp. v. Laitram Corp., 274 F.3d 1336 (Fed. Cir.

2001)). The Merriam-Webster Dictionary defines the term tune as "to adjust with respect to resonance at a particular frequency, or to adjust the frequency of the output of (a device) to a chosen frequency or range of frequencies". Merriam-Webster Dictionary (10th ed. 2003) (emphasis added). Accordingly, the plain meaning of the phrase "tuning the frequency range of the antenna" is adjusting the range of resonant frequencies of the antenna.

The specification is consistent with the recitation's plain meaning of adjusting the range of resonant frequencies of the antenna. For example, in a passage describing an embodiment of the second end of the feedback conductor formed as an inductive endcoil, Applicants describe:

> [i]f the endcoil 34 of the feedback conductor 33 is placed at the bottom of the helical radiator 30, as shown in FIG 3, resonance may be obtained at a plurality of frequency bands, which are relatively close to each other. For instance, the center frequency of the lowest frequency band may be at 900 MHz, followed by a next frequency at either 1500 MHz or 1750 MHz. If the endcoil 34 is instead moved closer to the center of the helical radiator 30, the resonant frequency band of the antenna is compressed and is also shifted to lower frequencies, i.e. the resonant range of the lower frequency band is shifted slightly in frequency, whereas higher frequency bands are shifted slightly more in frequency. P. 7, ll. 6-19 (emphasis added).

In another passage describing an embodiment shown in FIG. 4 of the second end of the feedback conductor formed as linear conductor arranged in parallel either inside or outside a helical radiator, Applicants describe "[i]f the feedback conductor 43/53 is deeply inserted into the helical radiator 40, or is displaced along a considerable part of the helical radiator 50, the antenna properties are improved at high frequencies, when, the resonant frequency ranges of the antenna are shifted towards lower frequencies". P. 10, ll. 4-10.

The above-cited passages make clear that the second end of the feedback conductor adjusts the locations of the resonant frequency bands of the antenna within the plain meaning of the phrase "for tuning a frequency range of the antenna". In contrast, the offset portion 64 of Kenoun, cited by the Examiner in the final Action and Advisory Action as being read on by the recited "second end of the feedback conductor", does not tune the frequency range of the antenna, as the Examiner

contends. Instead, the offset portion 64 is used to adjust the width of the resonant frequency bands of the antenna 10, which are determined independently by the arrangement of the first and second segments 56, 58. In other words, the offset portion 64 is used to adjust the width of the resonant frequency bands of the antenna 10, but not to adjust the resonant frequencies of the antenna 10, as claim 17 requires.

The distinction between the offset portion 64 and the recited second end of the feedback conductor is not surprising in view of the other significant structural dissimilarities between Kenoun's antenna 10 and the antenna defined by claim 17. For example, Kenoun's antenna 10 lacks a feedback conductor, a deficiency that is discussed in detail in the following section. Briefly, Applicants describe that the substantially different design between the radiator and feedback conductor of the antenna—a design distinction inherent from the plain meanings of the recited terms—allows the currents in the segments to essentially be orthogonal in relation to one another. This results in a relatively low coupling between the segments. P. 6, ll. 7-12.

In contrast, the design of the first and second segments 56, 58 of Kenoun's antenna 10 are identical, ensuring a substantial mutual coupling between the segments (see, e.g., bores 34 and 36 in FIG. 2, and segments 56 and 58 in FIG. 3). Indeed, Kenoun describes that a second mode of resonance of the antenna 10 results from a coupling between the first and second segments 56, 58, as defined by a first distance 60 that separates the segments 56, 58. Col. 4, ll. 37-39. Moreover, Kenoun describes the use of a helical portion 66 of the third segment 62 that surrounds the first and second segments 56, 58 so that the wire 50 is self-coupled to the first and second segments 56, 58 through a surrounding dielectric core material. Col. 4, ll. 45-48.

It thus follows, given the significant structural dissimilarities between Kenoun's first and second segments 56, 58 and the radiator and feedback conductor of the antenna defined by claim 17, that Kenoun's offset portion 64 of the third segment 62 does not provide for tuning the frequency range of the antenna 10 as required of the recited second end of the feedback conductor. Instead, it is the arrangement of

Kenoun's second segment 58 in relation to the first segment 56 that provides for the tuning of the frequency range of the antenna 10. Applicants note that the recited second end of the feedback conductor cannot read on Kenoun's second segment 58 either, because the second end of the feedback conductor is defined to extend along the radiator in a second direction toward the second end of the radiator, opposite the direction of Kenoun's second segment 58.

Accordingly, the claims of Group 1 are patentable over Kenoun for at least the above reasons.

b) <u>A Feedback Conductor Extending Along the Radiator in a First Direction from the Second End of the Radiator Towards the First End of the Radiator</u>

In the final Office Action, the Examiner incorrectly contends that Kenoun discloses a "feedback conductor 58 having a first end connected to the second end 68 of the radiator, the feedback conductor extending along the radiator in a first direction from the second end towards the first end of the radiator". Final Action, p. 2. While Kenoun's conductor (or second segment) 58 may be similar in appearance to the claimed feedback conductor, Kenoun does not disclose that the conductor 58 provides feedback, e.g., to control the input impedance (i.e., the current and voltage conditions) of the antenna, as required by the claims.

In responding to the Applicants' prior-filed arguments that Kenoun does not disclose the recited "feedback" conductor, the Examiner states in the final Action that the patentee does not have to use the same terms as Applicants—<u>it is the structure shown</u>—and then reasserts that the claimed feedback conductor reads on Kenoun's second segment 58. <u>Id.</u> at 3 (emphasis added). While it is true that identity of terminology is not required to support an anticipation rejection, recited terms that are known by those skilled in the art to define structure cannot be disregarded as being "descriptive" or "functional".

Feedback is defined as "the return to the input of a part of the output of a machine, system, or process (as for producing changes in an electronic circuit that improve performance)". <u>Merriam-Webster Dictionary</u> (10th ed. 2003). It is also well

established in the electronic arts to utilize feedback to modify the "open-loop" impedance of a circuit or device. Thus, in the context of an antenna having a radiator that outputs energy, e.g., current and electromagnetic (EM) radiation, the plain meaning of "feedback conductor" is a conductor that provides feedback to the radiated output for producing changes in the radiator (e.g., the impedance) that improve performance.

The specification is consistent with the plain meaning of "feedback conductor". For example, in a passage describing an embodiment of the feedback conductor having an inductive endcoil, Applicants describe:

> [b]y providing the endcoil 34 around the helical radiator 30 as in FIG 3, <u>a feedback is obtained by means of which the input impedance (i.e. current and voltage conditions) of the antenna may be controlled</u>. Thus, if the helical radiator is provided with an electrical length, which corresponds to one half of the wavelength, <u>it is possible, thanks to the feedback</u> in combination with a correct dimensioning of the helical radiator 30, <u>to reduce the input voltage and increase the input current of the end fed halfwave dipole</u>, thereby obtaining an antenna input impedance, which is matched to a 50 ohm system. P. 8, ll. 6-16 (emphasis added).

Nowhere does Kenoun disclose that the second segment 58 provides feedback to the radiating first segment 56. Instead, Kenoun describes that a coupling between the similarly designed (e.g., linear) first and second segments 56, 58 results in a second mode of resonance of the antenna 10 defined by a first distance 60 that separates the segments 56, 58. Col. 4, ll. 37-39. Moreover, Kenoun describes the use of a helical portion 66 of the third segment 62 that surrounds the linear first and second segments 56, 58 so that the wire 50 is self-coupled to the first and second segments 56, 58 through a surrounding dielectric core material. Col. 4, ll. 45-48. Accordingly, the second segment 58 can be said to be a feed-forward element in the antenna 10, rather than a feedback conductor as required by the claims.

In contrast, Applicants describe that the substantial structural differences between the radiator (e.g., a helical structure) and the feedback conductor (e.g., a linear structure) of the antenna allows the currents in the segments to essentially be orthogonal in relation to one another, resulting in a relatively low coupling between

the segments. P. 6, ll. 7-12. Consequently, the feedback conductor can include loading elements, e.g., the endcoil shown in FIG. 3 or the linear portions 44, 54 shown in FIGS. 4 and 5, to provide feedback to the radiator, e.g., to control the input impedance of the antenna.

The explicit inclusion of the structural differences between the radiator and the feedback conductor (e.g., helical versus linear) in claim 17 is not necessary, as the plain meanings of the terms "radiator" and "feedback conductor" are understood by those skilled in the art to define such structural differences[3].

Therefore, because Kenoun does not disclose a "feedback conductor", the claims of Group 1 are patentable over the cited document for this reason as well.

## B. THE CLAIMS OF GROUP 2 ARE NOT ANTICIPATED BY KENOUN BECAUSE ALL OF THE CLAIMED FEATURES ARE NOT DISCLOSED IN THE CITED DOCUMENT

### 1. Features of the Claims

In addition to the distinctions noted above, the claims of Group 2 differ from the antenna arrangement described in Kenoun in that they define a radiator connected to the radio circuitry in the portable communication apparatus that is an elongated helical radiator. The miniaturization and substantially different design of the helical radiator as compared to the linear feedback conductor facilitates the currents in the two segments being essentially orthogonal to one another, resulting in the coupling between the segments to be relatively low. See P. 6, ll. 8-12.

Moreover, the loading provided by the arrangement of the feedback conductor in relation to the helical radiator allows the EM energy inside the volume of the radiator to be controlled, such that a desirable substantially traveling wave can form along the length of the helical radiator.

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[3] Nevertheless, claim 18 of Group 2, which further defines that the radiator of clam 17 is an elongated helical radiator, is patentable over Kenoun for the reasons discussed in Section VIII B.

### 2. Errors in Examiner's Rejection: Kenoun Does Not Disclose an Elongated Helical Radiator Having a First End to be Connected to Radio Circuitry in the Portable Communication Apparatus

In addition to requiring that a single prior document disclose, either expressly or inherently, each and every element as set forth in the claim, to support a rejection of anticipation, the elements disclosed in the prior document must also be arranged as required by the claim. MPEP § 2131 (citing In re Bond, 910 F.2d 831 (Fed. Cir. 1990)).

Notwithstanding that Kenoun does not set forth each and every element of claim 18, those elements present are not arranged as required by the claim. For example, claim 17 recites "a radiator having a first end to be connected to radio circuitry in the portable communication apparatus". Claim 18 additionally recites "wherein said radiator is an elongated helical radiator". Accordingly, claim 18 defines "an elongated helical radiator having a first end to be connected to radio circuitry in the portable communication apparatus", which is not disclosed in Kenoun.

In the final Action, the Examiner contends that "Kenoun et al show in Fig. 3, a helical radiator for a portable radio comprising a radiator having a first end 52 connected to the radio". Final Action, p. 2 (emphasis added). As best understood, it appears that the Examiner's position is that the elongated helical radiator recited in claim 18 reads on Kenoun's entire antenna, but such a position is not supported by the teachings of Kenoun.

As noted above, Kenoun describes an antenna 10 having a wire 50 that has a first end 52 connected to a monopole portion 12 of the antenna 10. Col. 3, l. 65 - col. 4, l. 2; and FIG. 3. The monopole portion 12 secures the wire 50 to a cellular communication device, such as a mobile phone. Col. 2, ll. 44-46; and FIG. 4. The wire 50 consists of three distinct segments. The first segment 56 begins at the first end 52 of the wire 50, and is connected to a transceiver circuit (i.e., radio circuitry) included in the cellular communication device through the monopole portion 12. Col. 4, ll. 5-6. Importantly, FIGS. 2 and 3 of the cited document, and the corresponding written description, clearly disclose that the first segment 56,

connected at the first end 52 to the radio circuitry through the monopole 12, is arranged in a straight line.

In contrast, claim 18 requires, and the specification supports, an elongated helical radiator having a first end to be connected to the radio circuitry in the portable communication apparatus. Indeed, each of the exemplary embodiments depicted in FIGS. 3-7 of this application show an elongated helical radiator 30-70 to be connected to the radio circuitry through respective first ends 31-71.

Although Kenoun describes that a third segment 62 of the antenna 10 includes a helical portion 66, the helical portion 66 is arranged between the second segment 58 of the antenna 10 and the open end 54 of the wire 50. Col. 4, ll. 9-12; and FIG. 3. Consequently, the helical portion 66 is not connected at a first end to the radio circuitry of the cellular communication device, as claim 18 requires.

In addition, any construction in which the helical portion 66 is considered to be "connected" to the radio circuitry at the first end 52 through the offset portion 64 and the first and second segments 56, 58 via the wire 50 would be inconsistent with the remainder of the final Action. For example, the Examiner states in the final Action that Kenoun describes "a radiator having a first end 52 connected to the radio, a second end 68, a feedback conductor 58 having a first end connected to the second end 68 of the radiator . . . the feedback conductor includes a second end 64 extending along the radiator". Final Action, p. 2 (emphasis added). It would be inconsistent, given the detail of structural interconnection provided in the Action, to then assert that the helical portion 66 is connected to the radio circuitry. Moreover, such a construction would be inconsistent with the understanding of those skilled in the art of antenna design.

Therefore, because Kenoun does not disclose an elongated helical radiator having a first end to be connected to radio circuitry in the portable communication apparatus, the claims of Group 2 are patentable over the cited document.

## IX. CONCLUSION

For at least the reasons set forth above, it is respectfully submitted that the rejection of claims 17-21, 25, 26, and 30-32 is improper and should be reversed.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on October 14, 2003

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______________________
*(Signature of Person Signing Certificate)*

Date of Signing: October 14, 2003

**APPENDIX A: CLAIMS AT ISSUE ON APPEAL**

17. An antenna for a portable communication apparatus, the antenna comprising a radiator having a first end to be connected to radio circuitry in the portable communication apparatus, and a second end, a feedback conductor having a first end, which is electrically connected to the second end of the radiator, the feedback conductor extending along the radiator in a first direction from the second end of the radiator towards the first end of the radiator, wherein the feedback conductor includes a second end, extending along the radiator in a second direction towards the second end of the radiator, for tuning a frequency range of the antenna.

18. The antenna according to claim 17, wherein said radiator is an elongated helical radiator.

19. The antenna according to claim 18, wherein the second end of the feedback conductor is wound in at least one turn outside the helical radiator near the first end of the helical radiator.

20. The antenna according to claim 18, wherein the second end of the feedback conductor is isolated and bent substantially 180°, wherein at least a portion of said isolated end of the feedback conductor extends inside at least a portion of the helical radiator substantially in parallel with a longitudinal axis of the helical radiator.

21. The antenna according to claim 18, wherein the second end of the feedback conductor is isolated and bent substantially 180°, wherein at least a portion of the isolated end of the feedback conductor extends outside the helical radiator substantially in parallel with a longitudinal axis of the helical radiator.

25. The antenna according to claim 17, wherein the radiator and the feedback conductor are molded into a dielectric material.

26. The antenna according to claim 17, wherein the radiator and the feedback conductor are enclosed in a dielectric radome.

30. A portable communication apparatus, comprising an antenna including a radiator having a first end to be connected to radio circuitry in the portable communication apparatus, and a second end, a feedback conductor having a first end, which is electrically connected to the second end of the radiator, the feedback conductor extending along the radiator in a first direction from the second end of the radiator towards the first end of the radiator, wherein the feedback conductor includes a second end, extending along the radiator in a second direction towards he second end of the radiator, for tuning a frequency range of the antenna.

31. The portable communication apparatus according to claim 30, wherein the antenna is formed as a stub antenna mounted on a housing of the portable communication apparatus.

32. The portable communication apparatus according to claim 30, wherein the apparatus is a mobile telephone.

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